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Third-Party Loan Guarantees: Measuring Literacy and its Effect on Financial Decisions

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Third-Party Loan Guarantees: Measuring Literacy and its Effect on Financial Decisions

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Abstract

Granting a third-party guarantee for a loan does not directly involve a financial transaction. Therefore, guarantors might not understand that they are taking on a liability, albeit contingent. We introduce literacy about guarantees as a novel and distinct aspect of financial literacy. For ten Eastern European countries, we find that 45 percent of individuals lack this form of financial literacy. Instrumenting individual guarantee literacy with regional cohort-specific financial literacy, we show that guarantee literacy significantly reduces the probability of acting as a guarantor. Our results are robust to a placebo analysis and several sensitivity checks.

JEL classification: D14, G51, G53

Keywords: Third-party loan guarantees, guarantee literacy, financial literacy, IV

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Non-Technical Summary

Third-party loan guarantees can facilitate access to credit and lead to lower interest rates for the borrower. The bank gains loan security, i.e., should the borrower default, the bank can demand repayment from the guarantor up to the outstanding loan amount including interest. Considering these advantages, it is not surprising that third-party loan guarantees remain a fairly widespread phenomenon in both advanced economies and emerging markets. Guarantors, however, may not be aware of the legal and financial obligations they take on when granting a loan guarantee, because it does not involve a financial transaction at the time when the contract is concluded.

In this paper, we study individuals' financial literacy regarding third-party loan guarantees (short: *guarantee literacy*) and analyze whether this form of literacy has an effect on acting as a third-party guarantor. We use unique microdata from the *OeNB Euro Survey*, a survey of private individuals which covers ten Central, Eastern, and Southeastern European countries. We introduce a novel survey question on guarantee literacy and collect evidence on whether people are currently acting as a guarantor for a loan.

We document that between 30 percent (Croatia) and 60 percent (Albania) of the adult population are not aware of the potential legal and financial consequences of acting as a guarantor. To study the effect of guarantee literacy on granting guarantees, we perform regression analyses with the information whether individuals are currently acting as a guarantor for a loan as the dependent variable. Our main explanatory variable is guarantee literacy. The control variables include socioeconomic characteristics as well as indicators of regional economic and financial development. We face several challenges when estimating the effect of guarantee literacy on granting guarantees. For instance, if those who have granted a guarantee have better literacy due to their experience acting as a guarantor, we capture the effect of granting a guarantee on guarantee literacy and not the other way around. To address such problems, we perform instrumental-variables estimation, i.e., we estimate our regression in two stages and employ a third variable which influences acting as a guarantor only via guarantee literacy.

Our research results show that people who are guarantee literate are less likely to act as guarantors compared to people who do not understand the potential legal and financial consequences of third-party loan guarantees. The effect we find is statistically significant, economically relevant, and robust to a placebo analysis and several sensitivity checks.

*Neither a borrower nor a lender be,
For loan oft loses both itself and friend.*
—William Shakespeare (*Hamlet*, Act 1, Scene 3)

1 Introduction

For several centuries, it has been common wisdom that borrowing from or lending money to a friend may put both the friendship and the money at risk. Compared to loans, third-party loan guarantees are often not treated with the same degree of caution. Since granting a third-party loan guarantee does not involve a financial transaction at the point of contract conclusion, guarantors are frequently not aware of the associated risks and potential consequences.

Agreeing to act as a guarantor for a loan is common in both emerging and advanced economies. In Albania, eleven percent of the adult population are currently acting as guarantors. In Poland, the share is four percent, with eleven percent of guaranteed loans being in arrears before the pandemic (BIK, 2018). In Germany, about three percent of over-indebted individuals name guarantee-related issues as the main reason for their indebtedness (Cred- itreform Wirtschaftsforschung, 2020). In the UK, nine percent of individuals have experience in acting as a guarantor for a loan (YouGov, 2021). During the last few years, guarantees have become widespread in the UK high-cost credit market—a development over which the Financial Conduct Authority has expressed alarm (FCA, 2017).

In this paper, we study individuals’ financial literacy regarding third-party loan guarantees (short: *guarantees*) and analyze the effect of this literacy on granting guarantees. To measure how well individuals understand the consequences of acting as a guarantor, we designed a new survey question on *guarantee literacy*. This question was included in the 2018 and 2019 waves of the OeNB Euro Survey—a survey on household finance conducted by the Austrian Central Bank in ten countries in Central, Eastern, and Southeastern Europe (short: *Eastern Europe*).

Our empirical analysis provides three main results that contribute to the understanding of individuals’ financial decisions. First, 45 percent of individuals are not aware of the consequences associated with a guarantee. Second, our survey question on guarantee literacy captures a specific concept that is not covered by the well-known questions on financial literacy. Third, guarantee-literate people are 11 percentage points less likely to act as guarantors than those who are guarantee illiterate.

To address endogeneity concerns when estimating the effect of guarantee literacy on the probability to grant a guarantee, we develop an instrumental-variables strategy using regional cohort-specific general financial literacy as an instrument for individual guarantee literacy. In addition, we conduct a placebo analysis where the information whether someone is currently granting an informal loan to family or friends is the dependent variable. We find that guarantee literacy has no effect on granting informal loans, which demonstrates that our results are not driven by unobserved characteristics, such as social norms or trust. This result and various robustness checks corroborate our finding that being guarantee literate lowers the probability that someone acts as a guarantor.

To conclude a third-party guarantee, three parties are required: bank, borrower, and guarantor. For the borrower, providing a guarantor as security will lead to lower interest rates and facilitate access to credit.¹ Guarantees grant the bank, up to the amount outstanding including interest, access to the wealth of the guarantor and, in contrast to collateral, not only to the pledged assets (De Haas and Millone, 2020).² The guarantor, while initially only agreeing to help the borrower gain access to credit, has to step in if the borrower defaults.

By introducing the concept of guarantee literacy, our paper adds a new aspect to the research on financial literacy and financial decision-making. There is a large body of research documenting individuals' levels of financial literacy and analyzing its impact on savings and investment behavior.³ By contrast, the household liability side has received much less attention—even though a lack of literacy may result in poor borrowing decisions that ultimately have a severe negative impact on individuals' financial well-being, especially in times of crises. With regard to financial literacy, the aspect of contingent liabilities that individuals take over when granting a guarantee has been neglected so far.⁴

Regarding household liabilities, using the “big three” financial-literacy questions covering interest rates, inflation, and risk diversification (Lusardi and Mitchell, 2008), it is shown that

¹So far, the research on guarantees has focused on access to credit for firms where guarantees are usually granted by the government (Zecchini and Ventura, 2009; De Blasio et al., 2018).

²For the role of collateral laws and registries on firms' access to finance, see Love et al. (2016) and Calomiris et al. (2017).

³For an overview of the respective literature before 2014, see Lusardi and Mitchell (2014); for more recent studies, see for example, Almenberg and Dreber (2015), Gaudecker (2015), Badarinza et al. (2016), Boisclair et al. (2017), Bianchi (2018), Morgan and Long (2020), or Hastings and Mitchell (2020).

⁴The contingency aspect also plays a role for insurance decisions. In our case, the guarantor is not the policy holder but insures the bank against the default risk of the borrower. Measures for insurance literacy are used, for example, by Cole et al. (2013).

individuals with higher financial literacy borrow less (Stango and Zinman, 2009), are less likely to have a costly mortgage (Disney and Gathergood, 2013), and are less likely to default on a sub-prime mortgage (Gerardi et al., 2013). Moreover, those with high financial literacy less often borrow informally, but more often formally (Klapper et al., 2013).

In addition, research has developed measures to capture specific liability aspects of financial literacy. Proposing a novel set of questions on debt literacy, Lusardi and Tufano (2015) show that people who are more literate with respect to the debt-specific questions are less likely to have high-cost debt products or excessive debt. Almenberg et al. (2020) add questions on attitudes towards debt and find that those who are uncomfortable with debt have lower debt ratios. Gathergood and Weber (2017) introduce questions on mortgage products and demonstrate that individuals with better mortgage literacy are less likely to choose expensive interest-only mortgages. Also focusing on mortgages, Van Ooijen and van Rooij (2016) show that debt literacy is lower than financial literacy in general and that those taking financial advice hold riskier mortgages, in particular, if they have a low level of debt literacy. Individuals with a better understanding of the exchange-rate risk of foreign-currency loans are less likely to take out such loans (Beckmann and Stix, 2015).

The main contributions of our paper are as follows: First, conceptually we introduce contingent liabilities, as created by a guarantee, as a new aspect to the financial-literacy literature. For this purpose, we develop a measure of how well individuals understand the consequences of a guarantee. Second, we present novel evidence, which is harmonized and comparable across countries, on how widespread both third-party guarantees and guarantee literacy are, and how guarantee literacy is associated with individuals' characteristics.⁵ Third, we analyze the effect of guarantee literacy on granting guarantees by employing an instrumental-variables approach. Financial literacy in the peer group serves as an instrument which we measure by average regional cohort-specific financial literacy. For our instrument, we calculate leave-out means, drawing on unique data on financial literacy that has been collected over the course of several survey waves of the OeNB Euro Survey.

The rest of this paper is organized as follows. In Section 2, we describe our data and introduce our new survey question on guarantee literacy. In Section 3, we demonstrate the validity and specificity of our new question and present descriptive evidence on the correlates

⁵To the best of our knowledge, we provide the only evidence on third-party guarantees that is comparable across countries.

of guarantee literacy. In Section 4, we explain our empirical framework and introduce regional cohort-specific financial literacy as an instrument for individual guarantee literacy. In Section 5, we show our main findings from OLS and IV estimations as well as a placebo analysis, and provide several robustness checks. Finally, we summarize and discuss our findings in Section 6.

2 Data and Background

The main data source for our analysis is the *OeNB Euro Survey*, a survey of private individuals on household finance. It has been conducted by the Austrian Central Bank since 2007 as a repeated cross-sectional face-to-face survey in ten Eastern European countries: six EU member states that are not part of the euro area (Bulgaria, Croatia, Czech Republic, Hungary, Poland, and Romania) and four EU candidates and potential candidates (Albania, Bosnia and Herzegovina, North Macedonia, and Serbia). In each country and in each survey wave, around 1,000 individuals are interviewed based on multistage random sampling procedures. Samples reflect a country’s population characteristics in terms of age, gender, region, and ethnicity. Weights are calibrated on census population statistics for each country and each wave separately. When pooling several countries, weights also take into account the relative size of each country’s population.⁶ We use data from the survey waves conducted in fall 2018 and 2019. In these waves, we introduce a new survey question that is central to our analysis of guarantee literacy.

The law of guarantees, based on contract law, stipulates that the guarantor is liable for the borrower’s outstanding debt including interest in case the borrower does not repay. Although there might be slight differences in the laws across countries, the core of the guarantee, namely the legal obligation it involves, is comparable across the ten countries. Table A1 in the Appendix presents the relevant legislation for each country in our sample. When signing the guarantee, the guarantor takes over a contingent risk—a fact, and the extent of which, the guarantor may not be aware of. With our new question, shown in Table 1, we measure individuals’ literacy about the consequences of granting a guarantee.

⁶For the remainder of the paper, we employ individual weights when showing statistics for countries separately. We employ the combined individual-population weights when showing statistics that pool several countries. We do not weight survey data when conducting regression analyses.

Table 1: Survey question on guarantee literacy

Concept	Survey question
Third-party guarantee	<p>Suppose your friend has taken out a consumer loan from a bank to finance his/her new car and you acted as a guarantor for this consumer loan. Then your friend loses his/her job and therefore is no longer able to repay the loan. What is your legal obligation as a guarantor?</p> <p>As a guarantor, I am obliged to</p> <ol style="list-style-type: none"> (1) immediately inform the bank about any financial difficulties my friend may run into, but I have no financial obligations. (2) financially support my friend but I do not have any financial obligations towards the bank where he/she took out the loan. (3) repay the outstanding amount of the loan excluding interest to the bank. (4) repay the outstanding amount of the loan including interest to the bank. (5) None of the statements is correct. (6) Do not know (7) No answer

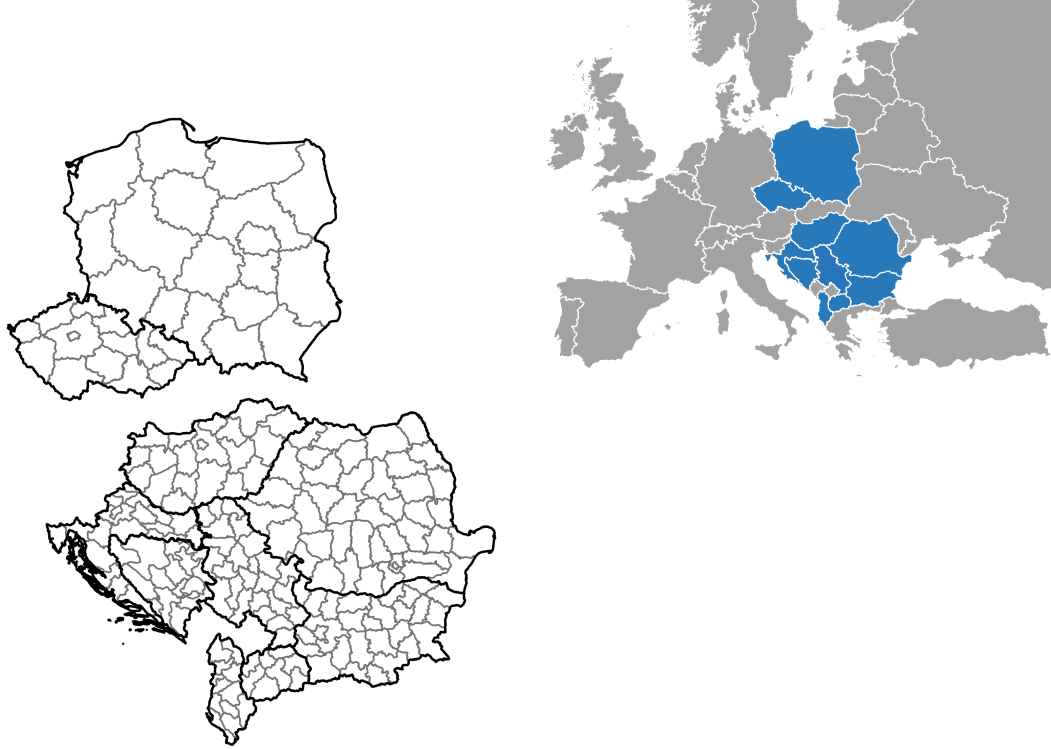
Notes: The table shows the survey question on guarantee literacy included in the OeNB Euro Survey. The correct answer is (4).

Respondents who choose answer (4) are fully aware of the risk involved in granting a guarantee; we classify them as being *guarantee literate*. Respondents selecting a response distinct from answer (4) are classified as being *guarantee illiterate*. Respondents selecting answer (3) grasp the contingent nature, but they underestimate the amount for which they are liable. In a robustness check, we show that classifying respondents who answer (3) or (4) as guarantee literate, does not change our results qualitatively.

We also ask respondents whether they have helped a family member or a friend during the last twelve months by (i) granting a loan, or (ii) acting as a guarantor for a loan. Given the known structure of loans, we can clearly assume that both forms of help would still be ongoing at the time of the interview. In addition to information about current informal loans and guarantees, we collect information as to whether individuals ever granted an informal loan or a guarantee (available for 2018 only).

The OeNB Euro Survey data include a rich set of information on individuals' socio-demographic characteristics, individual beliefs, attitudes, proxies for wealth, and usage of financial products. It also contains the addresses of the interviewer starting points for the random route sampling, i.e., we know that a respondent's residence is within walking distance of that starting point. This allows us to merge the survey data geographically with two indicators of the area where the respondent lives: (i) an indicator of regional economic activity measured by nightlight data (following Henderson et al., 2012) and (ii) an indicator

Figure 1: Regional subdivisions for instrumental-variables calculation



Notes: The figure shows regional subdivisions on which the calculation of our instrument is based. We distinguish regional subdivisions in line with the Eurostat NUTS 2016 classification. Our definition of regional subdivisions is generally equivalent to regions at the NUTS 3 level. In Poland, our definition of regional subdivisions is equivalent to regions at the NUTS 2 level (due to small numbers of observations at the NUTS 3 level).

of the regional banking environment (as in Beckmann et al., 2018). All variables used in our empirical analysis are described in Table A2.

We further make use of the fact that the OeNB Euro Survey (i) has been conducted over a long period of time, and (ii) contains the big three financial-literacy questions (see Table A4 in the Appendix for the exact wording).⁷ The data, which stems from a total of seven survey waves (2012–2016, 2018, and 2019), provides us with sufficient observations (around 70,000) to compute *regional cohort-specific financial literacy*, which we use as an instrument for guarantee literacy. Figure 1 illustrates the regional subdivisions we use, which are mostly equivalent to the smallest regions of the NUTS-2016 classification developed by Eurostat.

⁷We use the terms *financial literacy* and *financial knowledge* as synonyms, i.e., we use a narrow definition of the financial-literacy concept (see World Bank, 2014).

3 Descriptive Evidence

In this section, we address our first research question: *How well do individuals understand the consequences of granting a guarantee?* We provide descriptive statistics on guarantee literacy, compare it to the big three questions on financial literacy, and investigate how it is associated with individuals' socio-demographic and socio-economic characteristics.

3.1 Guarantee Literacy Versus General Financial Literacy

Our results show that 55.3 percent of the individuals correctly answer the survey question on guarantee literacy (by selecting answer 4) and can thus be considered *guarantee literate* (see Table 2).

Table 2: Answers to guarantee-literacy question

As a guarantor, I am obliged to ...	% of individuals
(1) Immediately inform the bank (but no financial obligations)	6.4
(2) Financially support my friend (but no financial obligations towards bank)	6.8
(3) Repay the outstanding amount of the loan excluding interest to the bank	9.2
(4) Repay the outstanding amount of the loan including interest to the bank	55.3
(5) None of the statements is correct	6.1
(6) Do not know	16.1

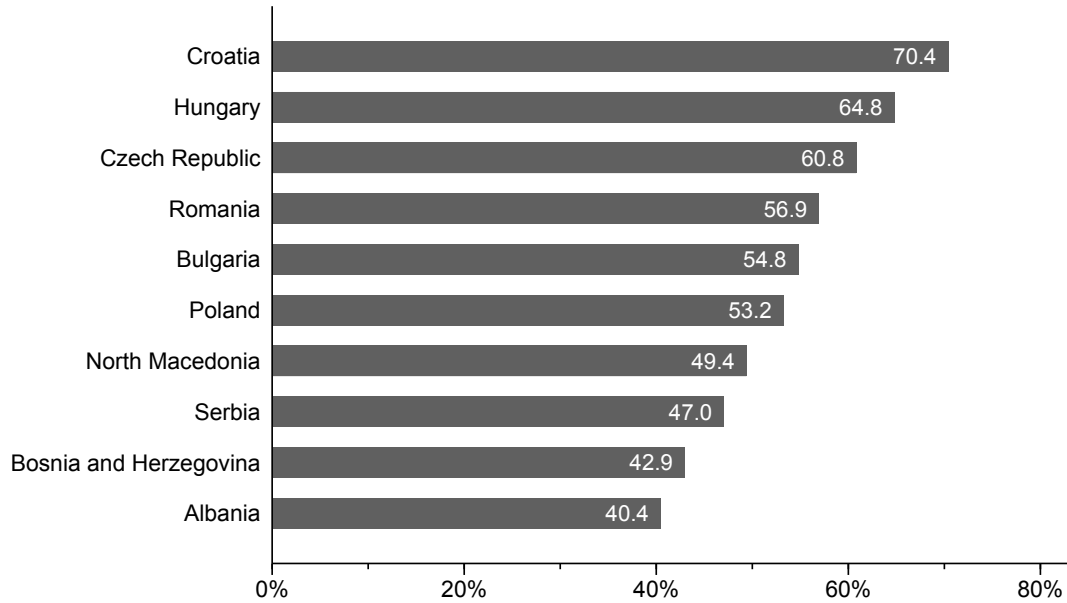
Notes: The table shows the distribution of responses to the survey question on guarantee literacy. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey, including all ten Eastern European countries covered by the survey. $N=19,965$.

Figure 2 shows that the level of guarantee literacy varies considerably across countries. In Croatia, 70.4 percent of the individuals select the correct answer. In Hungary and the Czech Republic, guarantee literacy is above 60 percent. More than half of the individuals are guarantee literate in Romania, Bulgaria, and Poland. Figures are below 50 percent in North Macedonia, Serbia, as well as in Bosnia and Herzegovina. Individuals in Albania are the least literate, with only 40.4 percent answering correctly.

To put our new survey measure into perspective, we compare the answers on guarantee literacy with the big three financial-literacy questions on interest rates, inflation, and risk diversification.

Table 3 shows that guarantee literacy is correlated with interest-rate, inflation, and risk-diversification literacy. The correlation is most pronounced for inflation literacy, where two thirds with the correct answer on guarantees also provide the correct answer on inflation. At

Figure 2: Variation in guarantee literacy across countries



Notes: The figure shows the country-specific percentage of individuals with correct answers to the survey question on guarantee literacy. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey. $N=19,965$.

the same time, 58 percent of those who are guarantee illiterate also give an incorrect answer to the inflation question. For risk diversification, the positive correlation is smaller, which is not surprising as literacy about risk diversification is much lower than about guarantees. While the association is positive, these results also indicate that guarantee literacy is a specific aspect of financial literacy that is not captured by the frequently used big three questions.

Table 3: Cross-question consistency of guarantee literacy and financial literacy

	Interest-rate literate		Inflation literate		Risk-diversification literate	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
All individuals	53.8	46.2	57.0	43.0	44.6	55.4
Only individuals . . .						
Guarantee literate	62.1	37.9	68.7	31.3	51.0	49.0
Guarantee illiterate	43.4	56.6	42.1	57.9	36.5	63.5

Notes: The table shows the percentage of individuals with (in)correct answers to the survey questions on guarantees, interest rates, inflation, and risk diversification (detailed in Tables 1 and A4). Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey, including all ten Eastern European countries covered by the survey. $N=19,464$.

3.2 Heterogeneity in Guarantee Literacy

To study which groups are more likely to be guarantee literate, we perform a multivariate regression analysis. We present results from estimating a linear probability model in Table 4. In the first specification, we study how individuals' guarantee literacy correlates with their socio-demographic characteristics. In the second specification, we add the three standard financial-literacy questions. In the third specification, we control for interviewer characteristics as suggested by Crossley et al. (2020), who show that interviewers introduce measurement error, especially when it comes to questions evaluating individuals' levels of financial literacy.

Our results show that younger individuals (18–35) are less likely to select a correct answer. Married and higher-educated individuals are more literate. Guarantee literacy is also more prevalent among those who are working and those with higher income. Our results mirror quite well what has been found in previous studies with respect to age and education (Lusardi and Mitchell, 2011) as well as income (Brown and Graf, 2013). The absence of a gender difference in the ten Eastern European countries may not be too surprising as they used to be communist, with comparatively equal gender roles. In other papers on formerly communist countries, the gender gap is also low (Bucher-Koenen and Lusardi, 2011; Cupák et al., 2018). For the countries in our dataset there is no gender difference in interest-rate literacy either, and only a small difference in literacy regarding inflation and risk diversification (Beckmann and Reiter, 2020).

Regarding the three standard financial-literacy questions, our results are in line with what we expected from our earlier analysis on cross-question consistency (Table 3). The positive coefficient is highest for inflation and lowest for risk diversification. When adding interview duration and interviewer characteristics, the results for socio-demographic characteristics and financial literacy do not change. Among these additional control variables, only the interviewer's age is positive and statistically significant, but the size of the coefficient is small.⁸

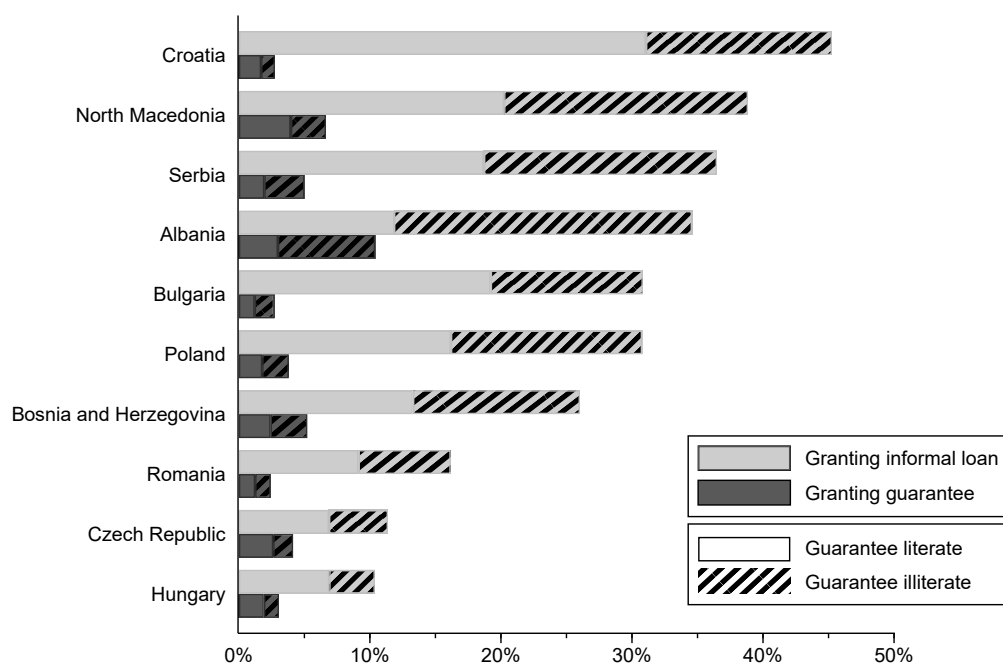
3.3 Granting of Guarantees

Figure 3 shows the percentage of individuals who are currently granting a guarantee (dark gray) or an informal loan (light gray). While individuals are more likely to provide informal loans, there is also a non-negligible share of individuals granting guarantees. In Albania, for

⁸We address interviewer effects in Section 4.1 and Section 5.3.

instance, the share of individuals granting a guarantee is as high as ten percent. For those currently granting a guarantee or an informal loan, the figure further shows the percentage of individuals who are illiterate (striped) or literate (solid) about guarantees. In some countries, the majority of individuals currently acting as guarantors is actually not aware of the potential legal and financial consequences of guarantees.

Figure 3: Granting informal loans and guarantees



Notes: The figure shows the percentage of individuals currently granting an informal loan or a guarantee to someone else. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey. For *granting an informal loan*, $N=19,888$; for *granting a guarantee*, $N=19,523$.

Table 4: Multivariate analysis of guarantee literacy

Dependent variable	Guarantee literate		
	(1)	(2)	(3)
<i>Socio-demographic characteristics</i>			
Female	-0.006 (0.007)	0.005 (0.007)	0.004 (0.007)
Age (ref: 36–50)			
18–35	-0.070*** (0.010)	-0.065*** (0.010)	-0.060*** (0.010)
51–65	0.020** (0.009)	0.012 (0.009)	0.011 (0.009)
65 or older	0.010 (0.015)	0.006 (0.015)	0.002 (0.014)
Education (ref: Secondary)			
Primary	-0.122*** (0.013)	-0.091*** (0.013)	-0.092*** (0.013)
Tertiary	0.056*** (0.010)	0.033*** (0.010)	0.035*** (0.010)
Married	0.015* (0.009)	0.016* (0.008)	0.017** (0.008)
Working	0.032*** (0.010)	0.037*** (0.009)	0.040*** (0.010)
Household income (ref: Low)			
Medium	0.048*** (0.012)	0.036*** (0.011)	0.034*** (0.011)
High	0.102*** (0.014)	0.069*** (0.013)	0.069*** (0.013)
Missing information	0.003 (0.014)	0.003 (0.014)	0.004 (0.014)
Size of town (log)	0.002 (0.003)	0.000 (0.003)	0.000 (0.003)
<i>Financial literacy (Big Three)</i>			
Interest-rate literate		0.127*** (0.010)	0.125*** (0.010)
Inflation literate		0.170*** (0.010)	0.164*** (0.010)
Risk-diversification literate		0.056*** (0.010)	0.056*** (0.009)
<i>Interview(er) characteristics</i>			
Interviewer female			0.018 (0.016)
Interviewer age			0.002*** (0.001)
Interviewer education (ref: Secondary)			
Primary			0.133 (0.137)
Tertiary			-0.005 (0.014)
Interviewer experienced			-0.021 (0.015)
Interview duration			-0.001 (0.001)
Constant	0.325*** (0.040)	0.240*** (0.039)	0.192*** (0.050)
Mean DepVar	0.55	0.55	0.55
R-squared	0.06	0.11	0.12
N	19,935	19,434	19,434
Country FE	✓	✓	✓
Wave FE	✓	✓	✓

Notes: The table shows estimates from a linear probability model. The dependent variable is equal to 1 if an individual is guarantee literate, i.e., correctly answering the survey question on guarantee literacy (as detailed in Table 1), and 0 otherwise. Standard errors in parentheses are adjusted for clustering at the *primary-sampling-unit* and *time* level. ‘ref.’ indicates the omitted category. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. For the same analysis based on a probit model, see Table A5 in the Appendix. *Data Source:* OeNB Euro Survey.

4 Empirical Methodology

In this section, we address our second research question: *Does guarantee literacy reduce the probability of granting a guarantee?* We describe our model, discuss identification challenges, and explain our identification strategy.

4.1 Model

First, we estimate a linear probability model of the following form:

$$\mathbb{1}(\textit{Guarantor})_i = \alpha + \beta\mathbb{1}(\textit{GuaranteeLiteracy})_i + X_i'\gamma + X_r'\delta + \textit{CountryFE} + \textit{WaveFE} + \epsilon_i \quad (1)$$

The dependent variable, $\mathbb{1}(\textit{Guarantor})_i$, is an indicator of whether individual i is currently granting a guarantee. The main variable of interest, $\mathbb{1}(\textit{GuaranteeLiteracy})_i$, indicates whether individual i is considered guarantee literate in the sense that they know guarantors have to repay outstanding loan amounts including interest if the main borrower defaults. X_i' is a vector of control variables for an individual's socio-demographic characteristics (such as gender, age, education, and marital status) and socio-economic characteristics (such as labor-market status, income, wealth, and personal attitudes and beliefs). X_r' is a vector of control variables at the regional level r , including proxies for economic and financial development (such as night-light intensity and bank density). All regressions include country-fixed and wave-fixed effects.

Second, to isolate the effect of guarantee literacy from other factors and to address potential endogeneity issues, we propose an instrumental-variable strategy. To estimate Equation 1, we use two-stage least-squares. In the first stage, we estimate the effect of regional cohort-specific average financial literacy (\textit{RCFLit}_i) on guarantee literacy.

$$\mathbb{1}(\textit{GuaranteeLiteracy})_i = \alpha + \beta\textit{RCFLit}_i + X_i'\gamma + X_r'\delta + \textit{CountryFE} + \textit{WaveFE} + \epsilon_i \quad (2)$$

4.2 Identification Challenges

Estimating Equation (1) using ordinary least squares (OLS) likely causes our point estimates for β to be biased. Our list of control variables may well exclude factors that are correlated with guarantee literacy and that might also drive the decision to grant a guarantee. Cognitive ability is one example of an omitted variable in the financial-literacy research (Lusardi and Mitchell, 2014). While it is plausible to assume that one’s cognitive ability is positively correlated with guarantee literacy, it is not clear ex-ante if individuals with higher cognitive ability are more or less likely to act as guarantors.

Reverse causality may be another issue as individuals who have granted a guarantee might have better literacy due to their experience acting as a guarantor. In particular, guarantees might have been called on and, as a result, a guarantor would have been obliged to make loan repayments on behalf of the main borrower, which in turn would improve the guarantor’s understanding of the potential consequences of granting a guarantee. Guarantors may also be more literate simply because of having gone through the process of granting a guarantee.

In the literature about the effect of financial literacy on financial behavior, reverse causality usually leads to an upward bias of OLS estimates. For example, higher literacy increases the propensity to be financially included, and financial inclusion increases literacy—the two effects are reinforcing each other. In our case, however, OLS estimates are attenuated because in one direction the effect is positive, whereas in the other direction the effect is negative. Better guarantee literacy lowers the propensity to grant a guarantee, i.e., the expected coefficient is negative. Experience with granting a guarantee, however, increases guarantee literacy, i.e., the expected coefficient is positive. The OLS estimate would capture the combined effect of holding a guarantee, and the true effect of guarantee literacy on behavior would be a stronger negative one.

Another concern is that the responses to our survey question on guarantee literacy are a noisy measure of a person’s true guarantee literacy, giving rise to measurement error. Such measurement error could arise, for example, from respondents guessing the answer. If a respondent guesses the correct answer, we would wrongly classify this person as guarantee literate. As both the dependent variable and the main regressor are binary, the measurement error takes the form of misclassification. A positive probability of misclassification would lead

to attenuation bias in our estimates of β (Aigner, 1973). Assuming that β is negative, this would imply a positive bias.

Lusardi and Mitchell (2017) and Van Rooij et al. (2011) provide evidence that guessing is indeed prevalent in financial-literacy questions. To reduce the chance of a respondent guessing the right answer, we include six different response options in our survey question on guarantee literacy. This is different from the standard financial-literacy questions, which usually offer only up to four different response options (Lusardi and Mitchell, 2014). Taken together, there is still a $\frac{1}{6}$ chance that a respondent randomly guesses the right answer. As discussed in Section 3, measurement error could also arise from interviewer effects. Crossley et al. (2020) show that such interviewer-induced measurement error is particularly pronounced for financial-literacy questions. We address concerns regarding interviewer-related measurement error by including interviewer-level control variables in our robustness analyses.⁹

4.3 Estimation Strategy

To address the concerns related to endogeneity, we perform instrumental-variables estimations. Agnew et al. (2013) and Van Rooij et al. (2011) use financial literacy of siblings and parents as instruments for an individual’s financial literacy. However, one may question whether the financial literacy of parents or siblings is beyond the control of the individual. Bucher-Koenen and Lusardi (2011) and Klapper et al. (2012) use regional financial literacy as an instrument for an individual’s financial literacy. These papers employ proxies for regional financial literacy, such as the voting share of liberal parties, the number of universities, or the newspapers in circulation.

We combine these two types of instruments and introduce a new instrument to the literature: We use *cohort-specific averages of financial literacy in the region where the respondent lives* as an instrument for guarantee literacy. This instrument is based on data from seven survey waves of the OeNB Euro Survey (2012–2019),¹⁰ which includes the big three questions on financial literacy (Lusardi and Mitchell, 2008). These three questions serve to calculate a financial-literacy score (for each respondent) which equals the number of correctly answered financial-literacy questions—ranging from 0 to 3. Our instrument is calculated as the average financial-literacy score for all unique combinations of *region* and *cohort*. Regions are defined

⁹The number of interviews per interviewer is too low for fixed-effects estimation.

¹⁰Unfortunately, the 2017 wave does not include the big three financial-literacy questions.

in line with the EU Nomenclature of Territorial Units (NUTS) at level 3 (see Figure 1 for an illustration).

Cohorts are defined in terms of whether or not individuals experienced communism during their adult lives: The first cohort consists of individuals who experienced communism (*communist cohort*), i.e., individuals aged 18 or older in 1989. The second cohort consists of individuals who were younger than 18 in 1989, or not yet born (*post-communist cohort*). We define cohorts in this manner for two reasons. Firstly, the banking sector during the communist regimes was merely used for transaction purposes. Financial markets that require consumers to take informed and more complex financial decisions only developed after transition from planned to market economies. For the younger cohort, the formative years fall into this time, which is not the case for the older cohort. Secondly, during transition from planned to market economies, most countries experienced banking, currency, or other economic crises. It is reasonable to assume that such crisis experience will also affect literacy, e.g., in terms of an improved understanding of inflation after living through hyperinflation.

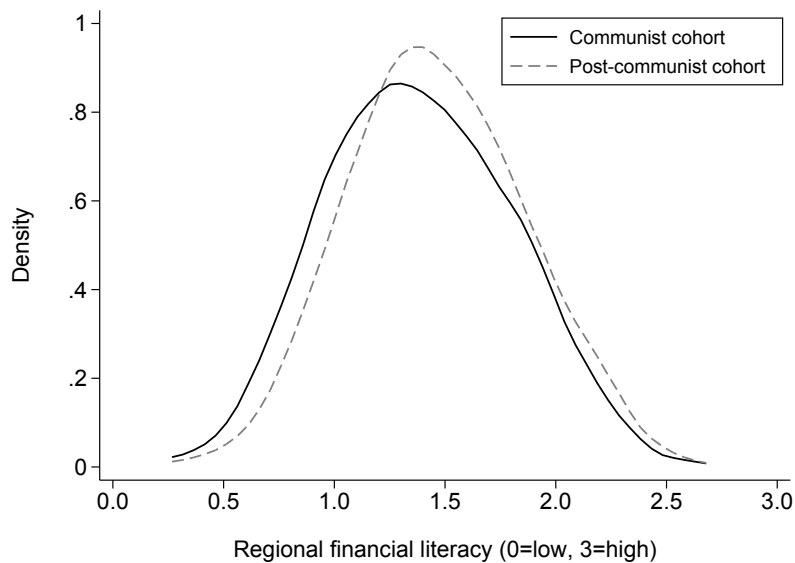
In terms of possible collinearities of our instrument and control variables, especially age, the following points need to be made: To calculate the regional cohort-specific average financial literacy, we calculate leave-out means (Townsend, 1994), i.e., we take into account responses from all the respondents living in the respective region and belonging to the respective cohort, but exclude the financial-literacy score of the respondent, whose guarantee literacy we instrument; this means that our instrument varies at the individual-respondent level (and not at the regional level). It is also important to note that depending on the survey wave, some age groups may fall into different cohorts: For example, a 41-year old respondent in the 2012 wave would belong to the “communist” cohort; in contrast, a 41-year old respondent in the 2019 wave would belong to the “post-communist” cohort.

In using cohort-specific averages of financial literacy in the region where the respondent lives as an instrument for guarantee literacy, we contend that exposure to more financially-literate individuals increases guarantee literacy.¹¹ Here, we draw on the empirical evidence

¹¹Bailey et al. (2018a) show that individuals are influenced by their geographically distant friends when buying a house, providing strong evidence that social networks and the extent of “social connectedness” have an impact on economic activity. This would suggest that geographic exposure may only cover one aspect of exposure to financially-literate individuals. However, the countries we cover exhibit a relatively low indicator of geographically-distant social connectedness (Bailey et al., 2018b). Moreover, in our countries under study, internet penetration and access varies strongly, from 52% of individuals with internet access at home in Albania to 84% in Poland. For those countries where internet penetration is low, the social connectedness indicator

that individuals' financial choices are influenced by that of their peers (Brown et al., 2008; Kaustia and Knüpfer, 2012). It is further reasonable to assume that the financial literacy of a whole cohort is beyond the control of a single individual belonging to that cohort. In Figure 4, we show the kernel densities of average regional financial literacy separately for the two cohorts. For the post-communist cohort (dashed line), the regional financial-literacy score is slightly higher on average than for the communist cohort (solid line).

Figure 4: Kernel-density plot of regional financial literacy, by cohort



Notes: The figure shows kernel-density estimates of the leave-out-mean regional financial-literacy score (ranging between 0 and 3) for the communist cohort (solid line) and the post-communist cohort (dashed line). The expected financial-literacy score would be 0.75 if response options were chosen randomly.

The identifying assumption underlying our estimation strategy is that, conditional on the observable characteristics of the individual and other controls, the instrument—regional cohort-specific financial literacy—is uncorrelated with the error term. The following two concerns may arise: First, regional financial literacy is likely correlated with economic prosperity or other characteristics of the region that may directly drive the prevalence of guaranteed loans; it is unlikely, though, that such regional factors would be correlated with *cohort-specific* regional financial literacy. Second, it might be that the cohort-specific regional reference group, which we employ to calculate our instrument, has similar social norms as the respondent,

likely overstates the importance of geographically-distant social linkage, because the sample of individuals who are using the internet and social media is not representative of the population.

especially since the cohorts are defined in terms of experience of communism. Some of our control variables, in particular religion, may partially capture social norms. Not being able to fully control for social norms might weaken the validity of the exclusion restriction associated with our instrument. We address this concern by conducting a placebo analysis, where the dependent variable is an indicator of whether individuals are currently lending money to family members or friends. The outcome for the main borrower (receiving a loan) and the risk of losing money for the person helping the main borrower is comparable. Of course, the two concepts differ in that not everyone may have the necessary liquidity to directly lend money, which we take into account by controlling for income and wealth. But the decisions to financially support family members or friends directly (by lending money), or indirectly (by granting a guarantee) are correlated with similar social norms. Guarantee literacy, however, should only affect the granting of a guarantee. If, in the instrumental-variables (IV) estimation, we were to observe an effect of guarantee literacy on granting informal loans, this would indicate that the instrument captured omitted variables, such as social norms. If we do not observe an effect of guarantee literacy on granting informal loans in the IV estimation, we would be confident that the instrument does not pick up omitted variables, such as social norms.

5 Main Results

In this section, we study the effect of guarantee literacy on granting guarantees. After our baseline results, we present a placebo analysis, and additional robustness checks.

5.1 Baseline Analysis

In Table 5, we report results from the OLS analysis (Panel A) and from the IV analysis (Panel B). In regression (1), we control for basic socio-demographic characteristics. In regression (2), we add control variables for income and wealth, and in regression (3), we additionally control for economic and financial development at the regional level. OLS estimates show a negative and significant association between guarantee literacy and the probability of granting a guarantee.

Table 5: Baseline and placebo analysis

	Baseline analysis: Granting guarantee			Placebo analysis: Granting informal loan		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: OLS						
Guarantee literate	-0.013*** (0.003)	-0.014*** (0.003)	-0.014*** (0.003)	-0.000 (0.006)	-0.006 (0.006)	-0.005 (0.006)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
Panel B: 2SLS (second stage)						
Guarantee literate	-0.077** (0.036)	-0.110*** (0.040)	-0.110*** (0.039)	0.064 (0.074)	-0.008 (0.078)	-0.012 (0.077)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
Panel C: 2SLS (first stage) – Guarantee literate						
Regional cohort-specific financial literacy	0.189*** (0.016)	0.175*** (0.016)	0.177*** (0.016)	0.193*** (0.016)	0.179*** (0.016)	0.182*** (0.016)
Kleibergen-Paap F-stat.	141.7	121.9	124.7	149.7	129.4	132.9
Panel D: Reduced form (OLS)						
Regional cohort-specific financial literacy	-0.015** (0.007)	-0.019*** (0.007)	-0.020*** (0.007)	0.012 (0.014)	-0.001 (0.014)	-0.002 (0.014)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
Country FE	✓	✓	✓	✓	✓	✓
Wave FE	✓	✓	✓	✓	✓	✓
Socio-demographic controls	✓	✓	✓	✓	✓	✓
Socio-economic controls		✓	✓		✓	✓
Regional controls			✓			✓

Notes: The table shows estimation results for granting a guarantee (columns 1 to 3), or granting an informal loan (columns 4 to 6). Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. For full results see Appendix, Table A7. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

For the IV estimation, the results of the first stage (reported in Panel C) show a positive and highly significant relationship between the regional cohort-specific financial literacy and an individual’s guarantee literacy. The Kleibergen-Paap F-statistic varies between 121.9 and 141.7 (for the different specifications in columns 1–3),¹² indicating that the instrument of regional cohort-specific financial literacy is a strong predictor of individual guarantee literacy. The estimates of the reduced form (reported in Panel D) show a negative and significant association between the instrument and the probability of granting a guarantee, further supporting the validity of our instrument.

Panel B reports the results of the second stage. Across all specifications we find that guarantee literacy has a negative effect on granting a guarantee: Being guarantee literate decreases the probability of granting a guarantee by 7.7–11 percentage points. This result is statistically significant and also economically relevant as about 5 percent of individuals

¹²According to Lee et al. (2021), 2SLS inference requires correction if the first-stage F-statistic is below 104.7. In our analyses (see Table 5), obtained F-statistics are above this threshold.

in our sample are guarantors. The significance level and size of the coefficient does not change when adding controls for regional economic and banking market development (compare specifications 2 and 3), which reassures us that our instrument does not pick up regional differences that drive our result. Notably, the coefficients of guarantee literacy are larger (in absolute values) than OLS estimates in all specifications, which we would expect from our discussion of endogeneity concerns in Section 4.1.

5.2 Placebo Analysis

In Table 5, columns 4–6, we present our placebo analysis estimating the effect of guarantee literacy on granting an informal loan. As discussed in Section 4.2, guarantee literacy should not influence the decision to grant an informal loan to family and friends unless it is correlated with some unobservable characteristics, such as social norms. Indeed, we do not see a significant effect of guarantee literacy on the lending to family and friends in any of the regression specifications. In the OLS estimation and the second stage of the IV estimation (Panel A and B), the coefficient of guarantee literacy is insignificant and so is the coefficient of regional cohort-specific financial literacy in the reduced-form estimation (Panel D).

5.3 Robustness

In our baseline analysis, we distinguish between individuals who are currently granting a guarantee and those who are not. The group of individuals who are currently *not* granting a guarantee is likely heterogeneous in terms of the experiences they have had with guarantees. We restrict the sample so that we can compare individuals who are currently granting a guarantee with individuals who have not yet had any experiences with guarantees. First, we drop the individuals who currently have a loan (not necessarily secured with a guarantee). Second, we drop the individuals who currently have a loan *secured with a guarantee*. Third, we drop the individuals who either have a loan secured with a guarantee or have ever granted a guarantee (see Table A9). Results are similar to our baseline findings. The significance of the IV estimate at the 10-percent level for the third sub-sample is probably due to the reduced number of observations (as we have information on whether or not an individual has ever granted a guarantee only for the 2018 survey wave). Taken together, these results suggest that our main result is *not* driven by individuals who are currently not granting a

guarantee but are more literate because they have past (poor) experience with guarantees and are therefore less likely to grant a guarantee.

We follow Haliassos et al. (2020) and vary the likelihood of interaction when constructing our instrument. For example, an individual’s literacy may be influenced by others who do not belong to the same cohort, e.g., by parents. We calculate general financial literacy at the regional level only (and do *not* take into account potential differences in literacy across cohorts) (see Table A10, column 1). For a few regions, our instrument is based on a relatively small number of observations (see Table A8). We repeat estimations dropping these regions from our analysis (column 2). Finally, we present estimation results with standard errors clustered at the time and PSU level (column 3). Results are remarkably stable for the specifications in columns (1) and (3), and slightly smaller in magnitude in column (2).

As discussed, it is unlikely that regional factors are correlated with *cohort-specific* regional financial literacy. In our baseline analysis we control for local nightlight and the local number of banks. In addition, digital access could affect both, the credit market and financial literacy. Table A11, column (1) shows estimation results where we control for mobile coverage. Furthermore, in column (2) we take Bailey et al. (2018a) into account and control for an index of social connectedness at the NUTS 3 level (Bailey et al., 2018b). Results are very close to our baseline results both in terms of magnitude and significance.

Even though there is only one correct answer to our question on guarantee literacy, it could be argued that an individual who thinks that the obligations related to granting a guarantee consist in repaying the outstanding amount of the loan *excluding* interest to the bank, understands the contingent nature of a guarantee and therefore can be considered literate. Classifying those individuals as *guarantee literate* who either state that the obligation of a guarantor consists in repaying the outstanding loan *including* interest or *excluding* interest, we show that the estimates obtained with the alternative measure are similar to those obtained with the original measure (see Appendix, column 1 of Table A12).

Another concern is that IV estimation may not correct for interviewer-induced measurement error (Crossley et al., 2020). We repeat our baseline analysis and control for interviewer age (see Table A12, column 2), which is the only interviewer characteristic that we found to be correlated with a person’s guarantee literacy in our regression analysis (see Table 4). As an alternative, we drop respondents from our analysis who were interviewed by older inter-

viewers (column 3). Results are unchanged (column 2) or slightly smaller (column 3) than our baseline.

Finally, estimating linear IV, we cannot rule out a heterogeneous treatment effect—the effect of guarantee literacy may not be the same for all adults. The linear IV estimates show the effect of guarantee literacy on the probability of granting a guarantee for those who are guarantee literate because their cohort in the region where they live has a high level of financial literacy, i.e., the local average treatment effect. Instead of estimating a linear probability model using IV, we estimate a bivariate probit model and report marginal effects (Table A13). Similar to our baseline, we find that guarantee literate individuals are 10.2 to 11.4 percentage points less likely to grant a guarantee, which could be taken as an indication that the local average treatment effect we estimate is close to the average treatment effect Chiburis et al. (2012).

6 Conclusion

In this paper, we study guarantee literacy and its effect on financial decision-making. We design a novel survey question to capture how well individuals understand the potential consequences of granting a guarantee. Comparing our new question with the so-called big three questions on financial literacy shows that we capture a specific aspect of financial literacy. According to our descriptive statistics, almost half of the individuals lack literacy about guarantees. Similar to other financial-literacy measures, guarantee literacy is associated with age, education, and income. In an IV estimation using regional cohort-specific financial literacy as an instrument, we show that literate individuals have a 11 percentage-point lower probability of granting a guarantee than illiterate individuals.

Guarantors will be increasingly called upon to repay loans secured by guarantees when the recession in the wake of the Covid-19 pandemic leads to a surge in loan defaults. As a result, guarantors may themselves fall into financial distress and lose an important share of their wealth, potentially facing economic and social difficulties. This could lead to demands to severely restrict loan guarantees in the future. Before reacting to these demands, policy makers should carefully consider the costs and benefits that guarantees have for society.

On the benefit side, guarantees are a potent means to foster access to credit which can be limited for two reasons. First, due to the characteristics of the borrower or the loan, the

bank may demand additional security. Granting a guarantee may be much less costly than using an asset as collateral in terms of transaction costs. Second, in countries where the institutional underpinning of the market is less sophisticated, guarantees are an important alternative to collateralization with immovable or movable property. Our results are based on ten countries that differ significantly in their economic and financial market performance and development—guarantees are likely used for both reasons, and contribute to making financial markets more efficient.

On the cost side, guarantors are primarily affected as they bear the risks associated with the contingent liability. Our research shows that individuals who are guarantee literate are less likely to grant a guarantee; they will consider the consequences of their decision more carefully. The aim of any policy intervention should, therefore, be to enable individuals to make informed decisions by building up guarantee literacy.

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Appendix

Table A1: Regulation of guarantees in the ten countries covered by the OeNB Euro Survey

Country	Legislation	Nature of guarantee	Extent of guarantor's liability	Source
Albania	Civil Code (Kodi Civil): Part 4. Obligations, Title 3. Means to Ensure the Execution of Obligations, Chapter 5. Surety, Articles 585–600.	Art. 585 Surety is a legal transaction wherewith a person (guarantor) shall be obliged to secure the performance of an obligation of a third person (main debtor) to the creditor. Surety shall be valid even where the debtor is not aware of it. Art. 587 Surety shall be documented.	Art. 589 The guarantor shall be liable to the extent of the obligation of the main debtor, including the payment of the interests, damages incurred due to the delays in enforcement and other expenses that the contractor has sustained to collect his credit, unless it has been accepted in the agreement that the surety is granted even for one part of the obligation, or with milder or less strict conditions than the main obligation. The surety subrogating the obligation or granted at more severe conditions than the main obligation shall be valid to the limits of the latter. Art. 590 The guarantor shall be jointly liable above the main debtor for performing the obligation, unless it has been provided for differently in the agreement. Parties may agree that the guarantor shall not be liable to make any payments prior to undertaking all the necessary arrangements binding the debtor to perform the obligation. Where the guarantor is sued and he seeks to refer to such an entitlement, he shall indicate the assets of the main debtor due to be subject to enforcement. The guarantor shall be bound to prepay the necessary expenses, as long as the parties have been agreed otherwise.	Unofficial translation made available by EURALIUS.
Bulgaria	Law of obligations and contracts: General Part, Title VII. Security on claims, Chapter 3. Guarantee, Articles 138–148.	Art. 138 (1) Under a guarantee contract the guarantor undertakes an obligation before another person's creditor to be liable for the performance of the other person's obligation. This contract must be in writing.	Art. 139 The guarantee may also be undertaken for a part of the debtor's obligations or under alleviated terms. If the guarantor has undertaken an obligation exceeding what the debtor owes or under more aggravated terms, his obligation shall be reduced to the amount of the principal obligation. Art. 140 The guarantee shall cover all consequences of the non-performance of the principal obligation, including costs on collection of the claim. Art. 141 (1) The guarantor shall be liable jointly and severally with the principal debtor. Art. 143 (1) A guarantor who has performed the obligation is entitled to claim from the debtor the principal, the interest, and the expenses he has made after notifying the debtor of the action he has brought against him. He shall also be entitled to the interest on the amounts paid from the date of payment.	Unofficial translation made available by law firm Ruskov & Colleagues.

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Table A1 (Continued)

Country	Legislation	Nature of guarantee	Extent of guarantor's liability	Source
Czech Republic	Civil Code (Občanský zákoník): Part Four – Relative Property Rights, Title 1. General Provisions on Obligations, Chapter 8. Securing and corroboration of debts, Section 2. Security of a debt – Suretyship, Articles 2018–2028.	Art. 2018 (1) A person who declares in relation to a creditor that he will satisfy him if the creditor's debtor fails to discharge his debt becomes the creditor's surety. A creditor who does not accept a surety may require nothing from him. (2) A suretyship declaration must be in writing.	Implicitly Art. 2019 (1) Suretyship is contingent on the debtor's debt being valid; suretyship may also be provided for future or conditional debts, as well as for a set of certain kind of debts incurred by the debtor at a particular time or a set of various debts arising from the same legal cause. Art. 2020 If suretyship secures only part of a debt, the scope of the suretyship is not reduced by partial performance as long as the debt is not discharged to the extent to which it is secured by the suretyship. Art. 2027 If the same debt is secured by several sureties, each of them is liable as a surety for the entire debt in respect of the creditor. A surety has the same rights with respect to the other sureties as a co-debtor.	Unofficial translation made available by the Ministry of Justice of the Czech Republic.
Hungary	Act V of 2013 on the Civil Code (2013. évi V. törvény a Polgári Törvénykönyvről): Book 6. Law of Obligations, Part 3. Express Contracts, Title XXI. Guarantee Agreements, Chapter LX. Contracts of Suretyship, Articles 6:416–6:430.	Art. 6:416 (1) Under a contract of suretyship the surety undertakes the obligation of performance to the creditor in the event of nonperformance by the principal debtor. (2) Suretyship may be provided to guarantee one or more existing or future, conditional or unconditional pecuniary claims of a specific amount or the amount of which can be determined, or any other claims of monetary value. (3) The contract shall be executed in writing.	Art. 6:417 (1) The obligation of a surety shall be adjusted to the obligation for which he has promised to answer. The obligation of a surety shall not and cannot subsequently exceed the original obligation; however, it shall cover the consequences of the debtor's non-performance and shall include the collateral claims that fall due after the suretyship is undertaken.	Unofficial translation made available by the Ministry of Justice of Hungary.
Poland	Civil Code (Kodeks cywilny): Third Book. Obligations, Title XXXII. Guarantee, Articles 876–887.	Art. 876 (1) Under a guarantee contract, the guarantor undertakes to the creditor to fulfill a debt in the event that the debtor fails to do so. (2) For a guarantee declaration to be valid, it must be in writing.	Art. 879 (1) The scope of the guarantor's obligation is determined by the respective scope of the debtor's debt. (2) However, the guarantor's obligation may not be extended by a legal transaction entered into by the debtor with the creditor after the guarantee has been assumed. Art. 881 In the absence of an agreement to the contrary, the guarantor shall be jointly and severally liable, similar to a co-debtor.	Translation made available by the <i>Institut für Ostrecht</i> München, Regensburg.

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Table A1 (Continued)

Country	Legislation	Nature of guarantee	Extent of guarantor's liability	Source
Romania	Civil Code (Codul civil): Book V. On Obligations, Title X. Personal Security, Articles 2279–2322.	Art. 2280 A guaranteee is a contract by which one party, the guarantor, agrees to the other party, who is the creditor in another binding contractual relationship, to fulfill the debtor's obligation free of charge or for a fee if the latter fails to do so. Art. 2282 A guaranteee contract must be in writing.	<i>Explicitly Art. 2290 (1)</i> Unless otherwise specified, the guaranteee of a principal obligation extends to all ancillary services, including the costs after the notarization of the guarantor and the costs associated with his summons to appear in court. <i>(2)</i> The guarantor shall be liable for the costs of litigation and enforcement brought by the creditor in proceedings against the principal debtor only if the creditor has notified him in advance. <i>Implicitly Art. 2306 (1)</i> The guarantor who has entered into the debtor's agreement may claim from the debtor what he has paid, namely principal, interest, and costs, as well as compensation for damages he has suffered as a result of the guarantee. He may also claim interest on any amount he has had to pay to the creditor, even if the principal debt had not produced interest.	Unofficial translation (special thanks to Codruta Rusu).

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Table A1 (Continued)

Country	Legislation	Nature of guarantee	Extent of guarantor's liability	Source
Bosnia and Herzegovina, Croatia, North Macedonia, Serbia*	B&H: Federation of Bosnia and Herzegovina: Law on obligations (Zakon o obligacionim odnosima) Republika Srpska: Law on obligations (Zakon o obligacionim odnosima): Part One, General Part, Chapter 29. Guarantee, Articles 997–1019. Croatia: Civil Obligations Act (Zakon o obveznim odnosima): Part One. General Part, Title VI. Alterations in Obligations, Chapter I. Alterations on the Side of the Subject, Section 6. Guarantee, Articles 104–126. North Macedonia: Law on obligations (Zakon za obligacionite odnosi): Chapter XXXIII Guarantee, Articles 1036–1058. Serbia: Law on obligations (Zakon o obligacionim odnosima): Part One, General Part, Chapter 29. Guarantee, Articles 997–1019.	Art. A By entering into a contract of guarantee the guarantor undertakes to the creditor to perform a valid and due obligation of the debtor if the latter fails to do. Art. B A contract of guarantee shall be binding for the guarantor only if the guarantor has given a statement of guarantee in writing.	Art. C (1) A guarantor's obligation shall not exceed the obligation of the principal debtor and if agreed otherwise, it shall be reduced to the scope of the debtor's obligation. (2) A guarantor shall be liable for the performance of the whole obligation for which he provided guarantee unless his liability is limited to one of its parts or is subject to less strict terms and conditions. (3) He shall be liable for reimbursement of all necessary expenses incurred by the creditor for the purpose of collecting the debt from the principal debtor. (4) The guarantor shall also be liable for every increase in the obligation arising from a delay or fault on the part of the debtor, unless agreed otherwise. (5) He shall be liable only for contractual interest due after entering into a contract of guarantee.	Information on the legal texts was made available by the <i>Institut für Ostrecht</i> München, Regensburg. Unofficial translation made available by the Supreme Court of the Republic of Croatia.

*Note: In former Yugoslavia, the Law on Obligations (Zakon o obligacionim odnosima) – which also regulated guarantees – was adopted in 1978. The law was adopted in all the successor states after the break-up of Yugoslavia. **Art. A/B/C** refers to Art. 997/998/1002 in B&H and Serbia, to Art. 104/105/109 in Croatia, and to Art. 1036/1037/1041 in North Macedonia.

Notes: The table provides information on the relevant legislation of guarantees separately for each of the ten countries in our study. Note that translations are tentative and do not represent official documents of the respective countries.

Table A2: Description of variables

Label	Description
Granting guarantee	=1 if the respondent has been acting as guarantor for someone else's loan during the past 12 months prior interview, and 0 otherwise.
Granting informal loan	=1 if the respondent granted a loan to family or friends over the past 12 months prior interview, and 0 otherwise.
Guarantee literate	=1 if correct answer to survey question on guarantees, and 0 otherwise (see Table 1).
Interest-rate literate	=1 if correct answer to survey question on interest rates, and 0 otherwise (see Table A4).
Inflation literate	=1 if correct answer to survey question on inflation, and 0 otherwise (see Table A4).
Risk-diversification literate	=1 if correct answer to survey question on risk diversification, and 0 otherwise (see Table A4).
Female	=1 if female, and 0 otherwise.
Age 18–35	=1 if aged between 18 and 35 years, and 0 otherwise.
Age 36–50	=1 if aged between 36 and 50 years, and 0 otherwise.
Age 51–65	=1 if aged between 51 and 65 years, and 0 otherwise.
Age 65+	=1 if aged 65 or older, and 0 otherwise.
Education primary	=1 if the respondent has primary education, and 0 otherwise.
Education secondary	=1 if respondent has lower secondary, upper secondary, or post-secondary non-tertiary education, and 0 otherwise.
Education tertiary	=1 if the respondent has first or second stage of tertiary education, and 0 otherwise.
Married	=1 if the respondent is married or living with a partner, and zero otherwise.
Working	=1 if the respondent is employed, self-employed, a contributing family worker, or an own account worker; and zero otherwise.
Religious	=1 if the respondent is religious (e.g., Christian, Muslim, Jew, Buddhist, etc.), and 0 otherwise.
Risk averse	=1 if risk averse, and 0 otherwise.
Size of town (log)	Logarithm of the number of inhabitants living in the town/village in which the respondent lives.
Household income low	=1 if the net household income is included in the first tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income medium	=1 if the net household income is included in the second tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income high	=1 if the net household income is included in the last tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income info missing	=1 if the respondent does not provide an answer to the income question, and zero otherwise.
Savings	=1 if the respondent has any of the following forms of savings: cash, bank accounts, life insurance, mutual funds, stocks, pension funds, bonds, or current account; and 0 otherwise.
Secondary residence	if the respondent or someone else in the household owns a secondary residence, and 0 otherwise.
Local nightlight (asinh)	Inverse hyperbolic sine of VIIRS nightlight within a radius of 20km around the respondent's place of residence.
Local number of banks	Number of banks within a radius of 20km around the respondent's place of residence.
Mobile coverage	indicator of local mobile coverage ranging from 0 (no mobile coverage) to 1 (4G coverage since 2012) based on annual maps from 2011 to 2018 by Collins Bartholomew's Mobile Coverage Explorer
Social connectedness index	Based on Bailey et al. (2018b), gadm1_nuts3 indicator. We use the maximum value of social connectedness outside the region of individuals' residence.
Interviewer female	=1 if interviewer is female, and 0 otherwise.
Interviewer age	Age of the interviewer; integer value ranging from 18 upwards.
Interviewer education primary	=1 if the interviewer has primary education, and 0 otherwise.
Interviewer education secondary	=1 if the interviewer has lower secondary, upper secondary, or post-secondary non-tertiary education, and 0 otherwise.
Interviewer education tertiary	=1 if the interviewer has first or second stage of tertiary education; and 0 otherwise.
Interviewer experienced	=1 if the interviewer has conducted interviews on behalf of the OeNB Euro Survey during the two survey waves prior the current interview.
Interview duration	Duration of the total interview in minutes.

Notes: The table shows a detailed description of all variables used.

Table A3: Summary statistics

	Min	Max	N	AL	BA	BG	CZ	HR	HU	MK	PL	RO	RS	Total
<i>(a) Respondents</i>														
Granting guarantee	0	1	19,523	0.11 (0.31)	0.06 (0.23)	0.03 (0.17)	0.04 (0.20)	0.03 (0.16)	0.03 (0.17)	0.07 (0.25)	0.03 (0.18)	0.02 (0.15)	0.06 (0.24)	0.05 (0.21)
Granting informal loan	0	1	19,888	0.34 (0.47)	0.27 (0.44)	0.32 (0.47)	0.11 (0.32)	0.45 (0.50)	0.10 (0.31)	0.37 (0.48)	0.31 (0.46)	0.16 (0.37)	0.40 (0.49)	0.28 (0.45)
Guarantee literate	0	1	19,965	0.41 (0.49)	0.44 (0.50)	0.56 (0.50)	0.61 (0.49)	0.71 (0.45)	0.65 (0.48)	0.49 (0.50)	0.53 (0.50)	0.57 (0.50)	0.50 (0.50)	0.55 (0.50)
Interest-rate literate	0	1	19,946	0.26 (0.44)	0.38 (0.49)	0.50 (0.50)	0.65 (0.48)	0.73 (0.44)	0.50 (0.50)	0.54 (0.50)	0.60 (0.49)	0.37 (0.48)	0.68 (0.47)	0.52 (0.50)
Inflation literate	0	1	19,834	0.33 (0.47)	0.40 (0.49)	0.77 (0.42)	0.68 (0.47)	0.63 (0.48)	0.61 (0.49)	0.46 (0.50)	0.50 (0.50)	0.56 (0.50)	0.63 (0.48)	0.56 (0.50)
Risk-diversification literate	0	1	19,934	0.48 (0.50)	0.35 (0.48)	0.29 (0.45)	0.62 (0.48)	0.42 (0.49)	0.45 (0.50)	0.29 (0.45)	0.53 (0.50)	0.29 (0.45)	0.38 (0.49)	0.41 (0.49)
Female	0	1	20,189	0.46 (0.50)	0.51 (0.50)	0.55 (0.50)	0.50 (0.50)	0.57 (0.49)	0.57 (0.50)	0.58 (0.49)	0.51 (0.50)	0.53 (0.50)	0.51 (0.50)	0.53 (0.50)
Age 18-35	0	1	20,182	0.35 (0.48)	0.29 (0.45)	0.20 (0.40)	0.27 (0.44)	0.33 (0.47)	0.22 (0.42)	0.28 (0.45)	0.34 (0.47)	0.29 (0.45)	0.28 (0.45)	0.28 (0.45)
Age 36-50	0	1	20,182	0.31 (0.46)	0.26 (0.44)	0.32 (0.47)	0.32 (0.47)	0.31 (0.46)	0.36 (0.48)	0.27 (0.44)	0.25 (0.44)	0.30 (0.46)	0.33 (0.47)	0.30 (0.46)
Age 51-65	0	1	20,182	0.32 (0.47)	0.30 (0.46)	0.33 (0.47)	0.24 (0.43)	0.27 (0.45)	0.30 (0.46)	0.27 (0.45)	0.23 (0.42)	0.25 (0.44)	0.28 (0.45)	0.28 (0.45)
Age 65+	0	1	20,182	0.02 (0.15)	0.15 (0.36)	0.15 (0.36)	0.17 (0.37)	0.09 (0.29)	0.12 (0.33)	0.18 (0.38)	0.17 (0.38)	0.16 (0.36)	0.10 (0.30)	0.13 (0.34)
Education primary	0	1	20,164	0.09 (0.28)	0.20 (0.40)	0.10 (0.29)	0.06 (0.24)	0.08 (0.27)	0.11 (0.32)	0.23 (0.42)	0.23 (0.42)	0.02 (0.15)	0.18 (0.38)	0.13 (0.34)
Education secondary	0	1	20,164	0.56 (0.50)	0.68 (0.47)	0.66 (0.39)	0.81 (0.44)	0.73 (0.44)	0.74 (0.49)	0.57 (0.49)	0.60 (0.49)	0.79 (0.40)	0.57 (0.50)	0.67 (0.47)
Education tertiary	0	1	20,164	0.35 (0.48)	0.12 (0.32)	0.24 (0.43)	0.13 (0.34)	0.19 (0.39)	0.14 (0.35)	0.20 (0.40)	0.17 (0.38)	0.18 (0.39)	0.25 (0.43)	0.20 (0.40)
Married	0	1	20,189	0.74 (0.44)	0.58 (0.49)	0.70 (0.46)	0.69 (0.46)	0.59 (0.49)	0.65 (0.48)	0.68 (0.47)	0.66 (0.48)	0.66 (0.47)	0.63 (0.48)	0.66 (0.47)
Working	0	1	20,189	0.68 (0.47)	0.39 (0.49)	0.64 (0.48)	0.70 (0.46)	0.61 (0.49)	0.74 (0.44)	0.42 (0.49)	0.57 (0.49)	0.57 (0.50)	0.61 (0.49)	0.59 (0.49)
Religious	0	1	20,189	0.97 (0.16)	0.99 (0.11)	0.93 (0.26)	0.30 (0.46)	0.89 (0.32)	0.77 (0.42)	0.99 (0.09)	0.86 (0.34)	0.98 (0.13)	0.99 (0.12)	0.87 (0.34)
Risk averse	0	1	20,189	0.28 (0.45)	0.24 (0.43)	0.26 (0.44)	0.22 (0.42)	0.31 (0.46)	0.36 (0.48)	0.34 (0.47)	0.26 (0.44)	0.27 (0.45)	0.13 (0.34)	0.27 (0.44)
Household income low	0	1	20,189	0.28 (0.45)	0.20 (0.40)	0.19 (0.40)	0.31 (0.46)	0.29 (0.45)	0.21 (0.41)	0.30 (0.46)	0.27 (0.44)	0.25 (0.43)	0.21 (0.41)	0.25 (0.43)
Household income medium	0	1	20,189	0.31 (0.46)	0.20 (0.40)	0.23 (0.42)	0.33 (0.47)	0.29 (0.45)	0.24 (0.43)	0.28 (0.45)	0.26 (0.44)	0.25 (0.43)	0.24 (0.42)	0.26 (0.44)
Household income high	0	1	20,189	0.25 (0.43)	0.19 (0.39)	0.22 (0.41)	0.32 (0.47)	0.31 (0.46)	0.21 (0.41)	0.24 (0.43)	0.24 (0.43)	0.25 (0.43)	0.27 (0.44)	0.25 (0.43)
Household income info missing	0	1	20,189	0.17 (0.37)	0.42 (0.49)	0.36 (0.48)	0.04 (0.19)	0.12 (0.32)	0.34 (0.47)	0.18 (0.39)	0.23 (0.42)	0.26 (0.44)	0.28 (0.45)	0.24 (0.43)
Savings	0	1	20,189	0.30 (0.46)	0.21 (0.41)	0.35 (0.48)	0.81 (0.39)	0.52 (0.50)	0.40 (0.49)	0.37 (0.48)	0.48 (0.50)	0.28 (0.45)	0.26 (0.44)	0.40 (0.49)
Secondary residence	0	1	20,189	0.05 (0.22)	0.08 (0.27)	0.12 (0.33)	0.05 (0.23)	0.09 (0.29)	0.04 (0.19)	0.10 (0.29)	0.11 (0.32)	0.05 (0.22)	0.14 (0.34)	0.08 (0.28)
<i>(b) Primary sampling unit</i>														
Size of town (log)	4	14	2,787	9.59 (2.14)	8.53 (2.33)	10.05 (2.65)	9.79 (2.37)	9.19 (2.50)	10.21 (2.45)	9.90 (2.39)	9.69 (2.55)	10.09 (2.25)	10.07 (2.50)	9.67 (2.48)
Local nightlight (asinh)	0	4	2,787	1.08 (0.57)	1.02 (0.43)	1.13 (0.78)	1.79 (0.71)	1.64 (0.84)	1.45 (0.98)	1.16 (0.70)	1.74 (0.88)	1.29 (0.82)	1.71 (0.87)	1.41 (0.83)
Local number of banks	0	31	2,787	9.53 (2.73)	11.75 (5.01)	14.99 (6.31)	15.20 (4.10)	17.25 (7.38)	8.24 (2.39)	11.60 (3.30)	16.12 (6.63)	16.29 (8.34)	22.78 (7.22)	14.42 (7.09)
<i>(c) Interviewers</i>														
Number of interviewers both waves				62	138	149	193	136	188	158	153	101	214	1,492
Number of interviewers 2018 wave				31	70	80	99	65	94	85	78	51	100	753
Number of interviewers 2019 wave				31	138	149	193	136	188	158	153	101	114	739
Interviewer female	0	1	1,492	0.71 (0.46)	0.63 (0.48)	0.88 (0.32)	0.71 (0.45)	0.79 (0.41)	0.81 (0.39)	0.79 (0.41)	0.81 (0.39)	0.80 (0.40)	0.82 (0.38)	0.79 (0.41)
Interviewer age	18	78	1,492	30.02 (4.73)	34.48 (11.51)	53.26 (11.24)	50.22 (13.00)	42.57 (13.56)	48.74 (11.25)	39.07 (12.09)	43.94 (10.47)	42.42 (14.03)	42.03 (11.01)	43.84 (13.17)
Interviewer education primary	0	1	1,492	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.11)	0.00 (0.04)
Interviewer education secondary	0	1	1,492	0.00 (0.00)	0.65 (0.48)	0.40 (0.49)	0.79 (0.41)	0.85 (0.36)	0.85 (0.36)	0.46 (0.50)	0.73 (0.44)	0.41 (0.49)	0.39 (0.49)	0.59 (0.49)
Interviewer education tertiary	0	1	1,492	1.00 (0.00)	0.35 (0.48)	0.60 (0.49)	0.21 (0.41)	0.15 (0.36)	0.15 (0.36)	0.54 (0.50)	0.27 (0.44)	0.59 (0.49)	0.59 (0.49)	0.41 (0.49)
Interviewer experienced	0	1	1,492	0.03 (0.18)	0.46 (0.50)	0.26 (0.44)	0.12 (0.33)	0.48 (0.50)	0.43 (0.50)	0.50 (0.50)	0.11 (0.31)	0.55 (0.50)	0.11 (0.32)	0.32 (0.47)
Interview duration	11	103	1,492	26.19 (6.13)	25.92 (8.47)	22.43 (7.63)	32.97 (8.76)	25.43 (7.50)	30.09 (8.46)	29.46 (12.18)	33.97 (8.18)	20.83 (6.74)	23.98 (10.46)	27.14 (9.68)

Notes: The table shows the (unweighted) sample means and standard deviations (in parentheses) of the respective variables. *Total* refers to the entire sample of observations without adjusting for country size. Panel (a) shows descriptive statistics for variables measured at the respondent level, panel (b) shows descriptive statistics for variables measured at level of primary sampling units, panel (c) shows descriptive statistics for interviewers. *Data Source:* OeNB Euro Survey.

Table A4: The “big three” included in the OeNB Euro Survey

Concept	Survey question
Interest rate	<p>Suppose you had 100 [local currency] in a savings account and the interest rate was 2% per year. Disregarding any bank fees, how much do you think you would have in the account after 5 years if you left the money to grow: more than 102, exactly 102, less than 102 [local currency]?</p> <p>(i) More than 102 [local currency]* (ii) Exactly 102 [local currency] (iii) Less than 102 [local currency]? (iv) Do not know (v) No answer</p>
Inflation	<p>Suppose that the interest rate on your savings account was 4% per year and inflation was 5% per year. Again disregarding any bank fees – after 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?</p> <p>(i) More (ii) Exactly the same (iii) Less* (iv) Do not know (v) No answer</p>
Risk diversification	<p>When an investor spreads his money among different assets, does the risk of losing money</p> <p>(i) Increase (ii) Decrease* (iii) Stay the same (iv) Do not know (v) No answer</p>

Notes: The table shows the three standard financial-literacy questions on interest rates, inflation, and risk diversification included in the OeNB Euro Survey. The correct answer is marked with an asterisk.

Table A5: Multivariate analysis of guarantee literacy - Probit model

Dependent variable	Guarantee literate		
	(1)	(2)	(3)
<i>Socio-demographic characteristics</i>			
Female	-0.006 (0.007)	0.005 (0.007)	0.004 (0.007)
Age (ref: 36–50)			
18–35	-0.070*** (0.010)	-0.065*** (0.010)	-0.060*** (0.010)
51–65	0.019** (0.009)	0.011 (0.009)	0.011 (0.009)
65 or older	0.010 (0.015)	0.006 (0.014)	0.002 (0.014)
Education (ref: secondary)			
Primary	-0.121*** (0.014)	-0.090*** (0.013)	-0.092*** (0.013)
Tertiary	0.056*** (0.010)	0.034*** (0.010)	0.035*** (0.010)
Married	0.015* (0.009)	0.016* (0.008)	0.017** (0.008)
Working	0.032*** (0.010)	0.037*** (0.009)	0.039*** (0.009)
Household income (ref: low)			
Medium	0.047*** (0.011)	0.035*** (0.011)	0.033*** (0.011)
High	0.101*** (0.014)	0.069*** (0.013)	0.068*** (0.013)
Missing information	0.003 (0.014)	0.003 (0.014)	0.005 (0.014)
Size of town (log)	0.001 (0.003)	0.000 (0.003)	0.000 (0.003)
<i>Financial literacy (Big Three)</i>			
Interest-rate literate		0.123*** (0.010)	0.121*** (0.010)
Inflation literate		0.163*** (0.009)	0.158*** (0.009)
Risk-diversification literate		0.056*** (0.009)	0.056*** (0.009)
<i>Interview(er) characteristics</i>			
Interviewer female			0.017 (0.016)
Interviewer age			0.002*** (0.001)
Interviewer education (ref: Secondary)			
Primary			0.135 (0.141)
Tertiary			-0.004 (0.014)
Interviewer experienced			-0.021 (0.015)
Interview duration			-0.001 (0.001)
Mean DepVar	0.55	0.55	0.55
Log-L	-13,118	-12,210	-12,172
N	19,935	19,434	19,434
Country FE	✓	✓	✓
Wave FE	✓	✓	✓

Notes: The table shows marginal effects from a probit model. The dependent variable is equal to 1 if an individual is guarantee literate, i.e., correctly answering the survey question on guarantee literacy (as detailed in Table 1), and 0 otherwise. Standard errors in parentheses are adjusted for clustering at the *primary-sampling-unit* and *time* level. ‘ref.’ indicates the omitted category. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A6: Baseline estimates – First-stage results

Dependent variable	Guarantee literate		
	ad (1)	ad (2)	ad (3)
Regional cohort-specific financial literacy	0.189*** (0.016)	0.175*** (0.016)	0.177*** (0.016)
Female	-0.011 (0.007)	-0.010 (0.007)	-0.010 (0.007)
Age (ref: 36–50)			
18–35	-0.062*** (0.010)	-0.067*** (0.010)	-0.066*** (0.010)
51–65	0.018* (0.009)	0.021** (0.009)	0.021** (0.009)
65 or older	-0.011 (0.013)	-0.009 (0.014)	-0.008 (0.014)
Education (ref: Secondary)			
Primary	-0.128*** (0.011)	-0.121*** (0.011)	-0.120*** (0.011)
Tertiary	0.067*** (0.009)	0.058*** (0.009)	0.057*** (0.009)
Married	0.028*** (0.008)	0.014* (0.008)	0.015* (0.008)
Working	0.052*** (0.009)	0.035*** (0.009)	0.035*** (0.009)
Religious	0.010 (0.013)	0.009 (0.013)	0.007 (0.013)
Risk averse	0.108*** (0.008)	0.110*** (0.008)	0.110*** (0.008)
Size of town (log)	0.001 (0.001)	0.001 (0.001)	0.005*** (0.002)
Household income (ref: Low)			
Medium		0.044*** (0.010)	0.044*** (0.010)
High		0.089*** (0.011)	0.093*** (0.011)
Missing information		0.006 (0.011)	0.009 (0.011)
Savings		0.031*** (0.008)	0.030*** (0.008)
Secondary residence		-0.070*** (0.013)	-0.070*** (0.013)
Local nightlight (asinh)			-0.055*** (0.007)
Local number of banks			0.006*** (0.001)
Constant	0.129*** (0.032)	0.134*** (0.032)	0.096*** (0.032)
Kl.-Paap F-stat.	141.7	121.9	124.7
N	19,290	19,290	19,290
Country FE	✓	✓	✓
Wave FE	✓	✓	✓

Notes: The table shows detailed first-stage regression estimation results underlying Table 5, Panel C, columns 1–3. ‘ref.’ indicates the omitted category. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A7: Baseline estimates – Second-stage full results

Dependent variable	Granting guarantee					
	Ordinary least squares			Instrumental variables (2SLS)		
	(1)	(2)	(3)	(4)	(5)	(6)
Guarantee literate	−0.013*** (0.003)	−0.014*** (0.003)	−0.014*** (0.003)	−0.077** (0.036)	−0.110*** (0.040)	−0.110*** (0.039)
Female	−0.002 (0.003)	−0.002 (0.003)	−0.002 (0.003)	−0.003 (0.003)	−0.003 (0.003)	−0.003 (0.003)
Age (ref: 36–50)						
18–35	−0.010** (0.004)	−0.010** (0.004)	−0.010** (0.004)	−0.013*** (0.005)	−0.016*** (0.005)	−0.016*** (0.005)
51–65	0.014*** (0.004)	0.014*** (0.004)	0.013*** (0.004)	0.015*** (0.005)	0.015*** (0.005)	0.015*** (0.005)
65 or older	0.004 (0.005)	0.002 (0.005)	0.003 (0.005)	0.003 (0.005)	0.001 (0.005)	0.001 (0.005)
Education (ref: Secondary)						
Primary	0.004 (0.005)	0.007 (0.005)	0.007 (0.005)	−0.005 (0.007)	−0.005 (0.007)	−0.005 (0.007)
Tertiary	0.014*** (0.005)	0.006 (0.005)	0.006 (0.005)	0.018*** (0.005)	0.011** (0.005)	0.011** (0.005)
Married	0.003 (0.003)	−0.001 (0.003)	−0.001 (0.003)	0.005 (0.003)	0.000 (0.003)	0.000 (0.003)
Working	0.032*** (0.004)	0.027*** (0.004)	0.026*** (0.004)	0.036*** (0.004)	0.030*** (0.004)	0.030*** (0.004)
Religious	0.015*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)
Risk averse	−0.020*** (0.003)	−0.019*** (0.003)	−0.019*** (0.003)	−0.013*** (0.005)	−0.008 (0.005)	−0.008 (0.005)
Size of town (log)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
Household income (ref: Low)						
Medium		0.005 (0.004)	0.005 (0.004)		0.009* (0.005)	0.009* (0.005)
High		0.015*** (0.005)	0.015*** (0.005)		0.024*** (0.006)	0.025*** (0.006)
Missing information		−0.011*** (0.004)	−0.011*** (0.004)		−0.011** (0.004)	−0.011** (0.004)
Savings		0.028*** (0.004)	0.028*** (0.004)		0.031*** (0.004)	0.031*** (0.004)
Secondary residence		0.040*** (0.007)	0.040*** (0.007)		0.033*** (0.008)	0.033*** (0.008)
Local nightlight (asinh)			0.005 (0.003)			−0.000 (0.004)
Local number of banks			−0.001*** (0.000)			−0.001* (0.000)
Constant	0.046*** (0.011)	0.045*** (0.011)	0.046*** (0.012)	0.068*** (0.017)	0.078*** (0.018)	0.075*** (0.017)
Mean DepVar	0.05	0.05	0.05	0.05	0.05	0.05
R-squared	0.02	0.03	0.03	0.00	−0.01	−0.01
Kl.-Paap F-stat. first stage				141.7	121.9	124.7
N	19,290	19,290	19,290	19,290	19,290	19,290
Country FE	✓	✓	✓	✓	✓	✓
Wave FE	✓	✓	✓	✓	✓	✓

Notes: The table shows estimates from a linear probability model using OLS (columns (1) to (3)) and IV (columns (4) to (6)). The dependent variable is equal to 1 for individuals currently granting a guarantee, and 0 otherwise. First-stage-regression results underlying columns (4) to (6) are shown in the Appendix in Table A6. Robust standard errors in parentheses. ‘ref.’ indicates the omitted category. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A8: Summary statistics of regional cohort-specific financial literacy

NUTS 3 Region	N	Financial-literacy score	
		Communist cohort	Post-communist cohort
<i>Albania</i>			
AL011	231	0.90	1.00
AL012	568	0.87	1.08
AL013	356	0.93	1.28
AL014	313	0.86	1.04
AL015	691	1.28	1.33
AL021	717	1.16	1.34
AL022	2,020	1.14	1.25
AL031	595	1.43	1.51
AL032	346	0.90	0.91
AL033	752	1.23	1.30
AL034	477	1.19	1.14
AL035	189	1.82	1.91
<i>Bulgaria</i>			
BG311	50	1.65	1.43
BG312	255	1.37	1.43
BG313	116	1.50	1.45
BG314	375	1.68	1.43
BG315	130	1.75	1.66
BG321	220	1.59	1.79
BG322	43	1.96	1.48
BG323	281	1.47	1.57
BG324	210	1.59	1.94
BG325	55	1.51	1.59
BG331	541	1.87	1.96
BG332	190	1.72	1.88
BG333	86	0.94	1.24
BG334	42	1.69	1.19
BG341	446	1.75	1.76
BG342	85	1.20	1.30
BG343	181	1.63	1.78
BG344	491	1.86	1.95
BG411	1,242	1.62	1.52
BG412	158	1.47	1.47
BG413	374	1.62	1.61
BG414	44	1.96	1.92
BG415	224	2.01	2.07
BG421	773	1.46	1.53
BG422	143	1.34	1.36
BG423	201	2.06	2.21
BG424	59	1.15	1.02
BG425	91	1.58	1.60
<i>Bosnia and Herzegovina</i>			
BH011	1,126	1.28	1.41
BH012	351	1.29	1.42
BH020	456	1.11	1.26
BH021	787	1.12	1.16
BH022	925	1.02	1.14
BH023	775	0.98	1.13
BH024	458	1.01	1.08
BH025	130	1.13	1.08
BH026	152	1.05	1.24
BH027	509	0.84	1.02
BH028	105	0.60	0.86
BH029	110	0.94	1.02
BH031	196	1.31	1.56
BH041	195	0.98	0.88
BH042	321	1.19	1.40

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Table A8 (Continued)

NUTS 3 Region	N	Financial-literacy score	
		Communist cohort	Post-communist cohort
BH043	111	0.64	0.64
BH044	122	1.14	1.07
BH045	258	1.25	1.33
<i>Czech Republic</i>			
CZ010	842	2.15	2.00
CZ020	895	2.04	2.00
CZ031	521	1.32	1.69
CZ032	315	2.26	2.32
CZ041	138	2.07	2.09
CZ042	630	1.75	2.12
CZ051	175	1.56	1.45
CZ052	482	1.93	2.20
CZ053	377	2.00	1.97
CZ063	515	1.64	1.57
CZ064	645	1.85	2.11
CZ071	129	2.02	2.09
CZ072	708	1.70	1.94
CZ080	852	1.75	1.98
<i>Croatia</i>			
HR031	432	1.71	1.56
HR032	88	2.03	2.04
HR033	131	1.91	1.89
HR034	289	1.73	1.78
HR035	695	1.20	1.40
HR036	422	1.64	1.65
HR037		not covered in 2018 and 2019 survey waves	
HR041	1,327	1.74	1.75
HR042	468	1.58	1.77
HR043		not covered in 2018 and 2019 survey waves	
HR044	563	1.54	1.56
HR045	172	1.36	1.57
HR046	162	2.23	2.01
HR047	154	1.60	1.80
HR048		not covered in 2018 and 2019 survey waves	
HR049	141	1.58	1.77
HR04A	406	1.87	1.86
HR04B	579	1.45	1.62
HR04C	179	1.56	1.48
HR04D	161	1.51	1.45
HR04E	434	1.48	1.57
<i>Hungary</i>			
HU110	1,259	1.66	1.60
HU120	824	1.64	1.65
HU211	294	1.81	2.03
HU212	214	1.80	1.67
HU213	258	1.60	1.43
HU221	314	1.52	1.45
HU222	179	1.13	1.14
HU223	195	1.77	1.64
HU231	286	1.81	1.92
HU232	243	1.58	1.56
HU233	170	2.04	1.94
HU311	460	1.88	1.95
HU312	227	2.00	1.67
HU313	132	1.96	1.96
HU321	380	1.45	1.53
HU322	265	1.32	1.07
HU323	379	1.66	1.83
HU331	360	1.60	1.63

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Table A8 (Continued)

NUTS 3 Region	N	Financial-literacy score	
		Communist cohort	Post-communist cohort
HU332	261	1.83	1.91
HU333	307	1.92	2.15
<i>North Macedonia</i>			
MK001	567	1.64	1.74
MK002	748	1.19	1.44
MK003	700	1.30	1.25
MK004	519	1.27	1.32
MK005	911	1.43	1.46
MK006	1,062	1.00	1.07
MK007	597	1.23	1.18
MK008	2,016	1.28	1.30
<i>Poland</i>			
PL21	555	1.55	1.62
PL22	869	1.13	1.47
PL41	592	1.80	1.86
PL42	342	0.83	0.90
PL43	122	1.60	1.55
PL51	604	1.36	1.39
PL52	180	1.21	1.31
PL61	437	1.34	1.36
PL62	169	1.23	1.26
PL63	422	1.32	1.43
PL71	570	1.10	1.23
PL72	230	1.25	1.05
PL81	393	1.44	1.63
PL82	411	1.29	1.45
PL84	271	1.81	1.68
PL91	491	1.63	1.56
PL92	361	1.28	1.40
<i>Romania</i>			
RO111	242	0.76	1.14
RO112	45	0.60	0.38
RO113	247	0.88	1.14
RO114	166	1.10	0.96
RO115	133	1.38	1.55
RO116	103	1.62	1.90
RO121	141	1.08	1.13
RO122	248	0.97	1.03
RO123	83	0.84	0.81
RO124	74	0.54	0.93
RO125	163	1.33	1.60
RO126	155	1.10	1.18
RO211	183	0.89	1.11
RO212	202	1.03	1.25
RO213	250	1.22	1.62
RO214	144	1.03	1.27
RO215	219	1.32	1.35
RO216	166	0.47	0.67
RO221	144	1.01	1.14
RO222	204	1.22	1.34
RO223	253	1.00	0.93
RO224	234	1.00	1.18
RO225	48	0.94	1.27
RO226		not covered in 2018 and 2019 survey waves	
RO311	244	1.31	1.18
RO312		not covered in 2018 and 2019 survey waves	
RO313	198	0.76	0.95
RO314	183	1.20	1.14
RO315		not covered in 2018 and 2019 survey waves	

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Table A8 (*Continued*)

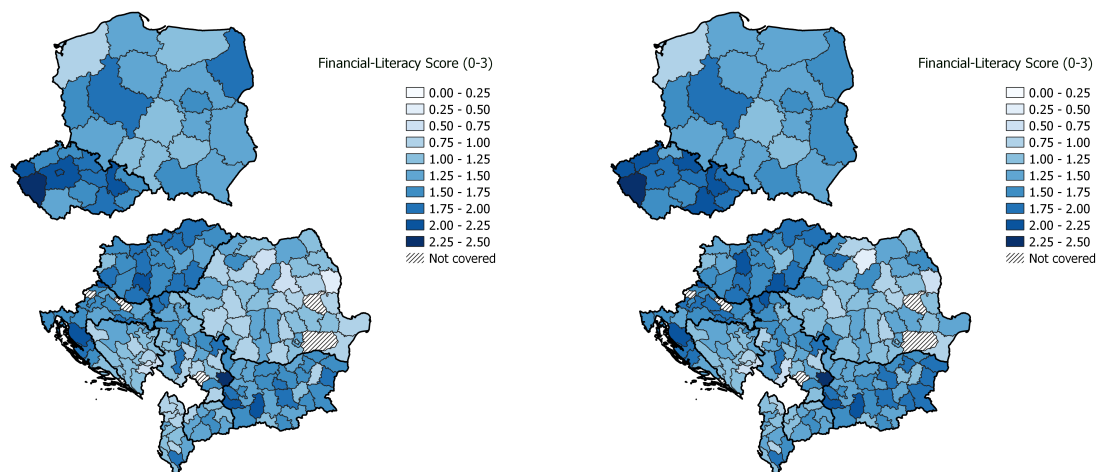
NUTS 3 Region	N	Financial-literacy score	
		Communist cohort	Post-communist cohort
RO316	298	1.04	1.40
RO317	126	0.81	1.06
RO321	665	1.12	1.23
RO322	69	1.26	1.37
RO411	239	0.90	1.11
RO412	142	0.98	1.19
RO413	108	1.09	1.56
RO414	166	1.30	1.36
RO415	104	1.26	1.33
RO421	187	1.31	1.51
RO422	136	0.99	1.15
RO423	176	0.96	0.79
RO424	222	1.03	1.19
<i>Serbia</i>			
RS110	1,679	1.51	1.52
RS121	212	1.84	1.85
RS122	284	1.06	1.28
RS123	543	1.32	1.65
RS124	134	1.15	1.61
RS125	166	1.99	2.22
RS126	163	1.26	1.24
RS127	425	1.51	1.68
RS211	231	1.24	1.34
RS212	141	1.13	1.42
RS213	356	1.23	1.00
RS214	297	1.95	1.92
RS215	274	1.42	1.37
RS216	294	1.00	1.06
RS217	291	0.77	0.75
RS218	238	1.00	1.21
RS221	167	1.76	1.87
RS222	149	1.56	1.55
RS223	183	0.93	0.97
RS224	196	1.59	1.66
RS225	273	1.10	1.42
RS226	140	2.48	2.44
RS227	270	1.27	1.40
RS228	202	0.91	1.15
RS229		not covered in 2018 and 2019 survey waves	

Notes: The table shows the (unweighted) sample means of the cohort-specific financial-literacy score at the *NUTS 3* regional level, and the underlying number of observations. For Poland, the table shows the cohort-specific financial-literacy score on the *NUTS 2* regional level (due to small numbers of observations on the *NUTS 3* regional level). For the calculation of the cohort-specific financial-literacy scores, we use data from seven survey waves of the OeNB Euro Survey (survey waves 2012, 2013, 2014, 2015, 2016, 2018, and 2019); for each *NUTS* region and each cohort, the average number of correctly-answered financial-literacy questions (ranging between 0 and 3) – excluding the respondent her/himself – is calculated. The expected financial-literacy score would be 0.75 if response options were chosen randomly. *Communist cohort* refers to the group of individuals aged 18 or older in 1989; *post-communist cohort* refers to the group of individuals aged 17 or younger, or not yet born in 1989.

Figure A1: Summary statistics of regional cohort-specific financial literacy

(a) Communist cohort

(b) Post-communist cohort



Notes: The figure maps the descriptive statistics from Table A8.

Table A9: Robustness – Variation in past guarantee exposure

	(1)	(2)	(3)
Panel A: OLS			
Guarantee literate	−0.010** (0.004)	−0.014*** (0.003)	−0.015*** (0.005)
Mean DepVar	0.06	0.05	0.06
N	14,706	18,378	8,183
Panel B: 2SLS (second stage)			
Guarantee literate	−0.134*** (0.049)	−0.113*** (0.040)	−0.125* (0.064)
Mean DepVar	0.06	0.05	0.06
N	14,706	18,378	8,183
Panel C: 2SLS (first stage)			
Regional cohort-specific financial literacy	0.181*** (0.018)	0.182*** (0.016)	0.187*** (0.025)
Kleibergen-Paap F-stat.	100.6	124.5	57.7
Panel D: Reduced form (OLS)			
Regional cohort-specific financial literacy	−0.024*** (0.008)	−0.021*** (0.007)	−0.023** (0.011)
Mean DepVar	0.06	0.05	0.06
N	14,706	18,378	8,183
Country FE	✓	✓	✓
Wave FE	✓	✓	✓
Socio-demographic controls	✓	✓	✓
Socio-economic controls	✓	✓	✓
Regional controls	✓	✓	✓

Notes: The table shows estimation results for granting a guarantee. Column (1) excludes individuals who are currently *not* acting as guarantor, but having a loan. Column (2) excludes individuals who are currently *not* acting as guarantor, but having a loan secured with a guarantee. Column (3) excludes individuals who are currently *not* acting as guarantor, but having a loan secured with a guarantee or having ever granted a guarantee. Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A10: Robustness – Instrument calculation and clustering

	(1)	(2)	(3)
Panel A: OLS			
Guarantee literate	−0.014*** (0.003)	−0.014*** (0.003)	−0.014*** (0.004)
Mean DepVar	0.05	0.05	0.05
N	19,290	17,688	19,290
Panel B: 2SLS (second stage)			
Guarantee literate	−0.109*** (0.040)	−0.078** (0.036)	−0.110** (0.053)
Mean DepVar	0.05	0.05	0.05
N	19,290	17,688	19,290
Panel C: 2SLS (first stage)			
Regional financial literacy	0.190*** (0.017)		
Regional cohort-specific financial literacy		0.213*** (0.018)	0.177*** (0.029)
Kleibergen-Paap F-stat.	126.6	143.6	37.9
Panel D: Reduced form (OLS)			
Regional financial literacy	−0.021*** (0.007)		
Regional cohort-specific financial literacy		−0.017** (0.008)	−0.020** (0.009)
Mean DepVar	0.05	0.05	0.05
N	19,290	17,688	19,290
Country FE	✓	✓	✓
Wave FE	✓	✓	✓
Socio-demographic controls	✓	✓	✓
Socio-economic controls	✓	✓	✓
Regional controls	✓	✓	✓

Notes: The table shows estimation results for granting a guarantee. In column (1), we use an alternative instrument, *regional financial literacy*. In column (2), we keep the original instrument, *regional cohort-specific financial literacy*, but exclude observations where the sample size for estimating regional cohort-specific financial literacy yields a power of less than 80%, assuming $z=1.96$. Robust standard errors in parentheses. In column (3), we repeat our baseline analysis and account for clustering standard errors at the time and primary-sampling-unit level. Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A11: Robustness – Mobile coverage and social connectedness

	(1)	(2)
Panel A: OLS		
Guarantee literate	−0.014*** (0.003)	−0.015*** (0.003)
Mean DepVar	0.05	0.04
N	19,290	17,335
Panel B: 2SLS (second stage)		
Guarantee literate	−0.109*** (0.039)	−0.104*** (0.040)
Mean DepVar	0.05	0.04
N	19,290	17,335
Panel C: 2SLS (first stage)		
Regional cohort-specific financial literacy	0.177*** (0.016)	0.178*** (0.016)
Kleibergen-Paap F-stat.	123.9	116.8
Panel D: Reduced form (OLS)		
Regional cohort-specific financial literacy	−0.019*** (0.007)	−0.018*** (0.007)
Mean DepVar	0.05	0.04
N	19,290	17,335
Country FE	✓	✓
Wave FE	✓	✓
Socio-demographic controls	✓	✓
Socio-economic controls	✓	✓
Regional controls	✓	✓

Notes: The table shows estimation results for granting a guarantee. In column (1), we add mobile coverage; in column (2), we add the social connectedness index (based on Bailey et al., 2018b) as control variables. The social connectedness index is not available for Bosnia and Herzegovina. Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A12: Robustness – Measurement of guarantee literacy and interviewer effects

	(1)	(2)	(3)
Panel A: OLS			
Guarantee literate redefined	−0.012*** (0.003)		
Guarantee literate		−0.014*** (0.003)	−0.013*** (0.003)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	17,649
Panel B: 2SLS (second stage)			
Guarantee literate redefined	−0.125*** (0.044)		
Guarantee literate		−0.117*** (0.042)	−0.092*** (0.034)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	17,649
Panel C: 2SLS (first stage)			
Regional cohort-specific financial literacy	0.157*** (0.015)	0.165*** (0.016)	0.205*** (0.017)
Kleibergen-Paap F-stat.	109.7	106.5	146.7
Panel D: Reduced form (OLS)			
Regional cohort-specific financial literacy	−0.020*** (0.007)	−0.019*** (0.007)	−0.019*** (0.007)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	17,649
Country FE	✓	✓	✓
Wave FE	✓	✓	✓
Socio-demographic controls	✓	✓	✓
Socio-economic controls	✓	✓	✓
Regional controls	✓	✓	✓

Notes: The table shows estimation results for granting a guarantee. In column (1), we use an alternative measure of guarantee literacy, equal to 1 if a respondent answers (3) or (4) in the survey question in Table 1, and 0 otherwise. In column (2), we repeat the baseline analysis and additionally control for interviewer age. In column (3), we winsorize interviewer age by country excluding all observations collected by interviewers whose age is above the 90th percentile of each country’s interviewer age distribution. Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

Table A13: Robustness – Probit and bivariate-probit models

	(1)	(2)	(3)
Panel A: Probit			
Guarantee literate	−0.011*** (0.003)	−0.012*** (0.003)	−0.012*** (0.003)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	19,290
Panel B: Outcome equation			
Guarantee literate	−0.102* (0.052)	−0.114** (0.050)	−0.107** (0.046)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	19,290
Panel C: Selection equation – Guarantee literate			
Regional cohort-specific financial literacy	0.188*** (0.016)	0.175*** (0.015)	0.178*** (0.016)
Panel D: Reduced form (Probit)			
Regional cohort-specific financial literacy	−0.016** (0.007)	−0.020*** (0.007)	−0.021*** (0.007)
Mean DepVar	0.05	0.05	0.05
N	19,290	19,290	19,290
Country FE	✓	✓	✓
Wave FE	✓	✓	✓
Socio-demographic controls	✓	✓	✓
Socio-economic controls		✓	✓
Regional controls			✓

Notes: The table shows marginal effects from probit models (Panel A and D) and bivariate probit models (Panel B and C). The dependent variable is equal to 1 for individuals currently granting a guarantee, and 0 otherwise. Socio-demographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlight and local number of banks. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Data Source:* OeNB Euro Survey.

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